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COMPETITIVENESS AND EDUCATION EVALUATION: THE OBSERVATORY FOR EDUCATION IN VIRTUAL ENVIRONMENTS

This article presents an analysis of the relationship of competitiveness, with some educational variables such as competence and training skills, innovation, as a substantial activity in higher education, and expenditures on education, from which outlines an assessment framework that provides the basis for the creation of the Online Observatory for education in virtual environments. The key findings are related to the impact of innovation on competitiveness and the need for establishing a flexible digital tool for the evaluation of education in virtual environments.

Keywords: *education in virtual environments, evaluation, innovation, competitiveness.*

Introduction

It is a fact that the demand for education has grown continuously at all levels, and the market looks for people with greater competences and abilities, which is reflected in the documents of diverse organizations on this topic that has served as a basis for part of this study presented [1, 2, 3].

There is coincidence between the analysis of various organizations and scholars in pointing out that to increase competitiveness, the biggest challenge nations are facing is the transformation of educational quality and thus its systematic evaluation [4, 5].

There is consensus as to point out that education systems have a huge gap between the expectations placed on them and their reality, existing a certain number of frameworks and evaluative standards, which in our view no longer meet current demands faced by education, mainly because they are subject to traditionalist views that try to "change" without altering the status of educational systems.

For new technology-mediated educational modalities in different degrees, it has been attempted to evaluate with traditional standards and indicators, regardless of their specific characteristics, even though there are several proposals focused on assessing the quality of this modality.

The relationship between education and economy, which among other aspects is manifested through competitiveness, falls within the category of organizations, characterized by constant changes, where information is exchanged easier and faster, hence it demands the creation and re-creation of new and dynamic learning environments. Being formerly an issue fundamen-

tally related to educational institutions, nowadays learning represents a strategic aspect for all of the organizations as a whole.

This work attempts to link some of the levels of competitiveness, with educational levels, in order to understand what variables of education have more influence on competitiveness.

Furthermore, it has been proposed a principle-dimension matrix as a basis for the Online Observatory for Distance Education as a flexible research tool with evaluation capacity.

The economic benefits of education: What and why evaluate?

What and why evaluate? This is the question most frequently asked in the academic community focused on the subject of evaluation. Of course the answer is clear: education is and will be one of the first links that has an impact on the welfare of society.

There are two theoretical approaches that attempt to analyze the demand function of education. First, the one that considers education as something fundamental, due to its utility and the benefit that it can give to individuals the conduction of studies and the acquisition of knowledge; On the other hand, the one that sees education as a good investment, that is to say, education is directly related to short or long term income (primarily economic), not only for people, but also for society.

This latter view has been dominant for many years in the economic theory, based on the human theory formulated by Ghez&Becker [6].

In this sense, it has attempted to clarify the role of education in economic and social development on the basis that for an individual to earn higher incomes he or she should be more productive.

Ber Bernanke [5], in a speech on this subject, confirmed the following: When I travel around the country, meeting with students, businessmen and other economic actors, from time to time they ask me for advice on investments. Usually the question is posed in jest… However, I will share with you the answer to the question today: Education is the best investment.

The relationship between education and economy, which among other aspects is manifested through competitiveness, falls within the category of organizations, characterized by constant changes, where information is exchanged easier and faster, hence it demands the creation and re-creation of new and dynamic learning environments. Being formerly an issue fundamentally related to educational institutions, nowadays learning represents a strategic aspect for all of the organizations as a whole.

Economists recognize that the skills of the workforce are an important source of economic growth. Moreover, the meager return on investment in education is likely to be the underlying cause of economic inequality. Poli-

cies that lead to efficient investment in education and training can help reduce inequality, while increasing economic opportunities [5].

Learning effectively in any area is nowadays everybody's challenge. Traditional behavioral training, with rigid and structured curricula, focused on programmed instruction and derived from a static view of knowledge required in the work process, loses its meaning in the current context [7].

It is recognized that there are multiple ways of how organizations learn through the people who integrate them. The course in the classroom is just a way to learn and may soon become a minority, and today it is already far from being the most important way of learning. Flexibility in the use of teaching methods and content structure in time and space, with open access and tailored to specific needs, seem to be the new requirements for educational institutions [8].

Flexible learning dispels the traditional view of hierarchy and power between those who teach and learn, between practical and theoretical ones, between the need for the organization and that of the individual, between explanation and evaluation, between explicit and tacit knowledge, between the cost and profit. The loss of that secular identification that the educational management had requires new tools and training processes.

The flexibility, adaptability, contextualization and especially the focus on learning rather than teaching, are some of the features that should meet the current tools and training processes. The fundamental problem lies in obtaining training from a holistic perspective and not as a discrete effort aimed at training individuals so that when they arrive at their organizations, they will have to receive training courses to acquire the competences and skills that were not taken into account.

The way forward is related to knowledge management approaches and talent in learning organizations, where the concept of training must undergo a dramatic turn. The society of knowledge is a society in which economic development and competitiveness depend on the willingness and ability of workers to continue learning singly and transmitting it from one to another.

2. Methodology.

The sample for comparison and analysis represent the first 15 countries worldwide in economic volume plus Finland (International observers insist on taking as an example the successful results of this country to give education and above all in higher education).

Data for analysis were taken from the World Competitiveness Raking and Pisa 2010 Inform, and the correlation coefficient was estimated between the observed variables.

Later we performed a documentary analysis of the various assessment frameworks and from a focus group of experts we elaborated the principle-

dimensional matrix based on the assessment model used for the Online Observatory.

Finally the tool that was developed is shown in this work.

3. Results

Competitiveness is conceptualized as a set of institutions, policies and factors that define the level of productivity of a country and its metric is based on the complex index of competitiveness, which is based on 12 pillars, such as: institutions, infrastructure, market size, health, etc., where education and innovation take an important place [2].

The notion of reading capacity (literacy) that PISA values [3] goes beyond the simple measurement of the student's capacity to decode and understand the information verbatim. This test involves understanding, application, reflection and compromise with written texts, both to achieve personal goals and to participate actively in society, in that way we expand the scope of its connotation.

The evaluation of math skills in PISA refers to solving real problems and the application of mathematical knowledge in a wide variety of contexts.

Understanding of science and technology contributes significantly to personal, social, professional and cultural life of today's citizens, therefore it is critical to know how to identify and explain scientific aspects as well as using scientific evidence based on the solution of problems.

Economies must be innovative to stay competitive and maintain a high level. Innovation must be promoted to a greater extent by educational institutions as an inherent function in this sector preparing people capable of carrying out this process, from their initial training. This is the reason why education should pay special attention to I + D + i.

Figure 1 shows the relationship between competitiveness as a dependent variable and innovation, competences evaluated in PISA (reading comprehension, mathematics and science) and educational expenses reflected through the increase of the expenditure between primary and secondary levels and tertiary levels or above.

Without being very thorough in the interpretation of this graph, we note that usually the most competitive countries like the United States and Germany do not have the best rates in the competences of the PISA exam, except for Finland, which is found in both cases among the first places. What it is a rule, is that the less competitive countries also have the lowest competences and abilities according to PISA.

As it can be seen with regard to innovation, there is a close relationship between competitiveness and innovation, that is to say, the most competitive countries have high rates of innovation in education systems, rate which considers among other things, the university-company relationship, the innovation capacity, the use of patents and technology transfer.

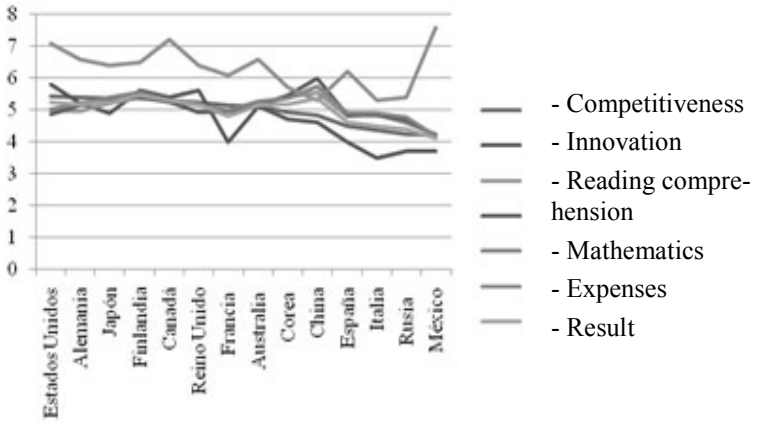

Fig 1. Relationship between competitiveness, innovation, competences and educational expenses [2,3]

2 Data adjusted by authors

3 Country: United States – Germany – Japan – Finland – Canada – United Kingdom – France –Australia – Korea – China – Spain – Italy – Russia – Mexico.

The countries selected in the sample spend roughly between 38000 and 9000 American dollars per year for students at all educational levels.

However, as it can be seen, the increase in the expenditure between primary, secondary and tertiary education is very significant in some countries, but there is neither significant relationship with competitiveness nor with innovation.

The coefficient of correlation between competitiveness and innovation is 0,978, which shows that there is an almost perfect positive correlation between these two variables.

With regard to the coefficient of correlation between the variables of competences (reading comprehension, mathematics and science), the best correlation of competitiveness is shown with the competence of reading comprehension with 0,468, then with the competence of sciences with 0,436, finally with the competence of mathematics with 0,382.

It is clear that innovation is the element that exerts the greatest influence on competitiveness.

3.1 Evaluation and the online observatory for education in virtual environments.

Organizations and educational institutions in Europe and America have proposed various frameworks and standards for evaluating distance education.

From our side, we have taken into account the analysis of the impact on competitiveness and the study of existing proposals as assessment frame-

works; we have taken the model of the principle-dimension matrix as a basis shown in Table No 1 [9, 10, 11, 12].

Source: Authors

The Online Observatory for education in virtual environments4 (Online Observatory) is a flexible research tool and open to the evaluation of units and objects related to the modality of distance education.

4. http//www.observatoriovirtual.udg.mx
5. http://www.ecoesad.org.mx/
6. http://www.universidadeslectoras.org/
7. http://www.ceibal.org.uy/
8. http://www.cread.org/

The Online Observatory is an innovative project in development where 39 Mexican institutions are currently participating in the framework of Space for Distance Education (ECOES) [5] and the Network of Latin American Readers [6], the Ceibal Plan [7] of Uruguay, which is part of the Inter-American Distance Education Corsortium8 (CREAD).

It has four fundamental areas: evaluation, prospective, networks and intelligence, as well as other support areas, such as resources, tools and courses.

The area of evaluation is currently available to be used by the academic community, where it is possible to perform the evaluation of 5 units of analysis, such as: educational programs, online courses, research and development projects, cultural events and information centers.

The steps in the evaluation process are:

1. Selection of unit of analysis. It is necessary to select one of the proposed units such as: Educational program, Course, Projects, Cultural Event and Information Center.

2. Selection of categories. Categories will be related to the type of evaluation model such as national, international or regional, which considers different approaches in the construction of indicators.

3. Selection of indicators. Indicators will be selected from each of the evaluative models, and will also be configured by users

4. Self-evaluation. Once the indicators have been selected, the evaluation process will be carried out, and the reports of results will be generated.

5. Evaluation of the indicator used. Then, it is necessary to make a brief evaluation of the indicators used in order to be validated.

6. Definition of strengths and weaknesses by category.

7. Global evaluation or evaluation summary.

8. Meta-evaluation by peer reviewers.

Table 1

Principle-Dimension Matrix of distance education

Principles/ Dimensions	Technology Infrastructure	Student	Teacher	Institutional and external context	Design and curricular development	Management and administratio n	Information services
Coverage	Accessibility	Equity	Availability Opportunity	Inclusion	Accessibility Opportunity Flexibility	Availability Opportunity Flexibility	Accessibility Availability Opportunity Flexibility
Sustainability	Connectivity	Self-management	Consolidation	Feasibility	Consolidation Flexibility Sufficiency	Consolidation	Permanence Openness Currently
Anticipation	Foreseeing	Availability	Availability	Link Articulation	Articulation Participation	Foreseeing Provision	Foreseeing Provision
Communication	Connectivity	Interaction Reciprocity	Interaction Reciprocity	Link Articulation Synergy	Participation	Participation Articulation Reciprocity	Diffusion Distribution
Collaboration	Interoperability	Mobility	Mobility	Cooperation Synergy	Collaborative management	Collaborative management	Learning communities
Pertinence	Usability	Pertinence	Pertinence	Relevance	Congruence	Congruence	Pertinence Usability
Innovation	Creation Improvement Optimization Incorporation	Creativity Polyvalence Self-management	Creativity Self-improvement	Transference Link Organizational intelligence	Innovation Diversification Flexibility	Improvement Intelligence organizational Flexibility	Creation Diversification Flexibility Optimization Personalization

The platform is supported by a dynamic database and a tool BI (Business Intelligence), focused on the management and creation of knowledge through the analysis of data saved during the evaluations. This set of tools and methodologies have in common the following characteristics:

- Assigning user role. During the registration process users select their role from which they will have certain privileges.

- Accessibility to information. Data are the main source of this concept. The first thing this type of tools and techniques must ensure is the user access to data regardless of the source.

- Flexibility and contextualization. This tool has an interface that allows users to customize their own evaluation (previously authorized by the administrator) or their own unit of analysis with the corresponding categories and indicators.

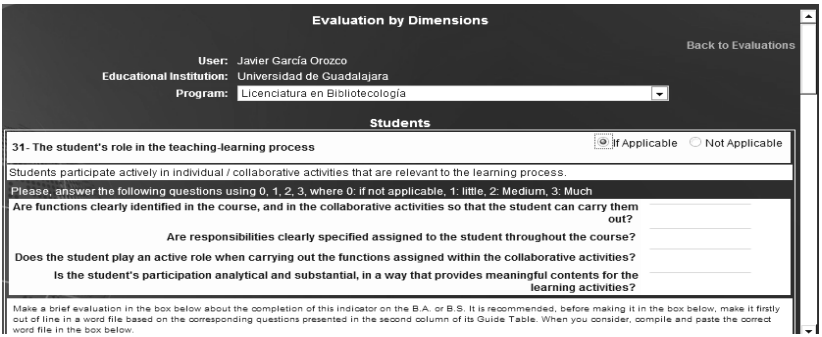

Fig. 2. Selection of categories and dimensions

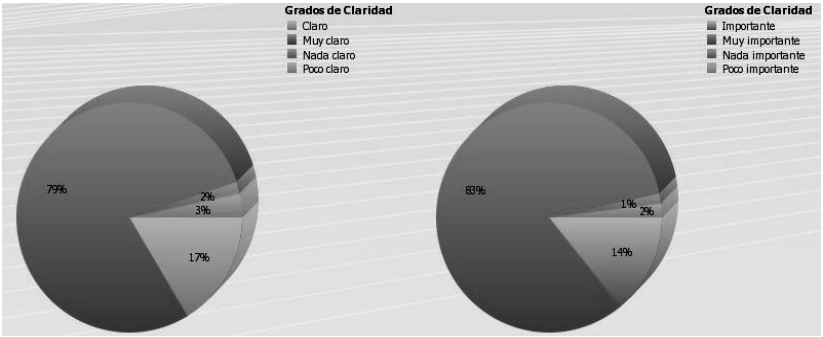

Fig. 3. Graphs of the Online Observatory

- Support in decision making. It seeks to go beyond the presentation of information so that users have access to analysis tools that allow them to select and manipulate data for decision-making.

- Guiding the user final. Independence is sought from the users' technical knowledge, and their capacity to apply these tools to generate reports in formats for direct use.

- Meta-evaluation. It permits to carry out the evaluations made by the users of the platform.

Conclusion

There is no extensive correspondence between competences and competitiveness and even less between the type of expense by educational level and competitiveness, which shows for the time being, that tertiary education must be focused on the axis of innovation when linking university-company to have an impact on competitiveness.

We present the development of a flexible new tool based on information programs that allow the evaluation of units and educational objects based on a model that considers the whole framework above-mentioned, and allows the permanent analysis of the information saved proposing new knowledge patterns on the educational field which enhances its impact on competitiveness.

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Орозко Х.Г., Морено А.В., Гарсиа А.М. **Конкурентоспроможність та оцінювання рівня освіти: огляд освіти у віртуальних середовищах**

В роботі представлений аналіз зв'язку конкурентоспроможності з показниками рівня освіти таких як компетентність та майстерність, інноваційність, як основна діяльність у вищій освіті, та витрат на освіту, через оцінку чинників, що забезпечують створення Онлайнової Обсерваторії для моніторинга освіти у віртуальних середовищах. Основні результати стосуються конкурентоспроможності та необхідності гнучкого цифрового засобу оцінювання освіти у віртуальних середовищах.

Ключові слова: *освіта у віртуальних середовищах, оцінювання, інноваційність, конкурентоспроможність.*

Орозко Х.Г., Морено А.В., Гарсиа А.М. **Конкурентоспособность и оценка уровня образования: обзор образования в виртуальных средах**

В работе представлен анализ связи конкурентоспособности с показателями уровня образования такими как компетентность и мастерство, инновационность, как основная деятельность в высшем образовании, и расходов на образование, через оценку факторов, обеспечивающих создание Онлайновой Обсерватории для мониторинга образования в виртуальных средах. Основные результаты касаются конкурентоспособности и необходимости гибкого цифрового средства оценивания образования в виртуальных средах.

Ключевые слова: *образование в виртуальных средах, оценка, инновационность, конкурентоспособность.*

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